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GENUS *HEDYCHIUM* IN EASTERN INDIA

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ABSTRACT

This paper re-evaluates the various morphological characters of taxonomic interest in the genus *Hedychium*, suggests recognition of only 17 species in Eastern India within the limits of 19 species studied, proposes a key for their easy recognition and presents an enumeration of the species together with field data on the habit and habitat of each species. It seems that the edges of the tropical and subtropical evergreen forests provide "natural home" for the genus *Hedychium*, although *H. aurantiacum* and *H. densiflorum* ascend higher to temperate altitudes. *H. aureum*, *H. gratum*, *H. greenii*, *H. hookeri* and *H. marginatum* and a few varieties of *H. coronarium* turn up as endemics to Eastern India.

H. luteum Herb. Calcut. as a biotype of *H. coronarium* and *H. griffithianum* Wall. as synonymous to *H. venustum* Wight and finally, *H. coronarium* var. *elwesii* (Baker) Naik comb nov. and *H. coronarium* var. *subditum* (Turrill) Naik comb. nov. as two new combinations are proposed.

Genus *Hedychium* was first established by Koenig in 1783 (Retz. Obs. fasc. III. p. 73) based on the type and sole species *H. coronarium*. Horaninow in *Prodromus Monographiae Scitaminearum* (1862) divided this genus into two sections *Gandasulium* and *Macrostemium* on the basis of the relative lengths of the stamen and the lip. This course is also followed by J. G. Baker in Hooker's Fl. Brit. Ind. vol. 6 (1892) pp. 225-227. Section *Gandasulium* in which stamen is never much longer than the lip comprises 6 species *H. coronarium*, *H. elwesii*, *H. marginatum*, *H. venustum*, *H. spicatum* and *H. densiflorum*. The other section *Macrostemium* in which stamen is much longer than the lip comprises 18 species *viz*. H. *crassifolium*, *H. longicornutum*, *H. gomezianum*, *H. ellipticum*, *H. villosum*, *H. aureum*, *H. gracile*, *H. griffithianum*, *H. thyrsiforme*, *H. hookeri*, *H. gardnerianum*, *H. speciosum*, *H. stenopetalum*, *H. coccineum*, *H. aurantiacum*, *H. luteum*, *H. gratum* and *H. elatum*. Of these, all species excluding *H. crassifolium*, *H. longicornutum* and *H. gomezianum* (which are Malayan and Burmese in distribution) are represented in Eastern India. *H. greenii*, belonging to the section *Gandasulium* and described from Bhutan by W. W. Smith (1911), has been collected from Darjeeling also. *H. wardii* described from Lohit Frontier Division, N.E.F.A. by Fischer (1936) could not be available for study. This paper presents 19 of the 23 East Indian species referred to above, re-evaluates various morphological characters of taxonomic interest and proposes the merging of the 19 East Indian species to 17 species only.

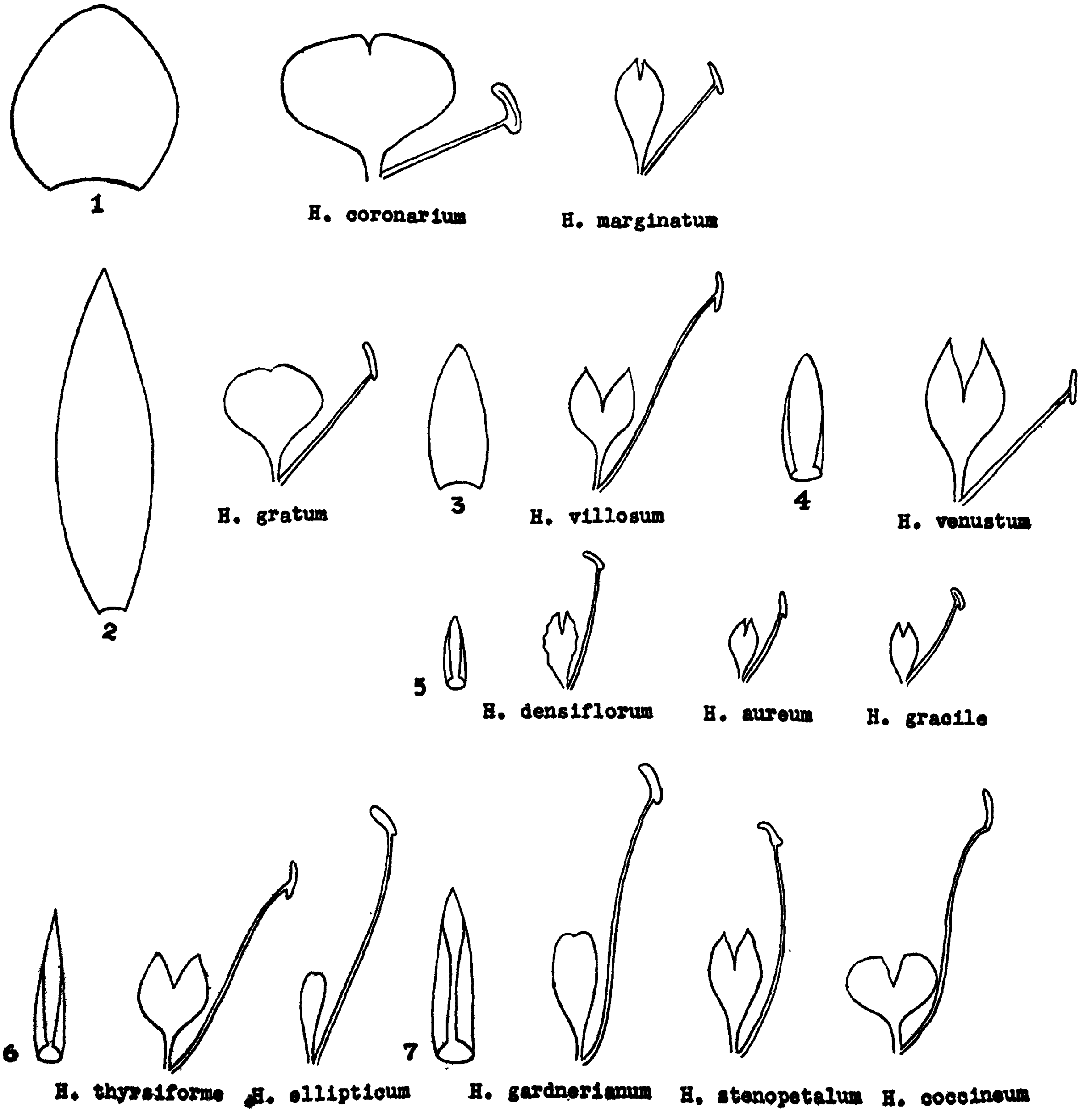
Observations were made from the study of herbarium specimens from different herbaria, namely Regional herbarium, Botanical Survey of India, Eastern Circle, Shillong; Central National Herbarium, Sibpore and F.R.I. Herbarium, Dehra Dun. Studies were also made from the fresh specimens under cultivation in the experimental garden of Botanical Survey of India, Eastern Circle, Shillong, as well as on species in their wild habitats.

Hedychium is distinguished by the following characters: Terrestrial or epiphytic herbs. Root fibres rather stout from a stout creeping perennial rhizome. Leafy stem annual, never branched, invariably enclosed or covered by leaf-sheaths, dying after flowering. Leaves distichous, oblong or lanceolate, generally shining green above and paler and glabrous or pubescent beneath, always with a very narrow hyaline or cartilaginous margin, sessile or shortly petiolate on the sheath. Ligule generally brownish or reddish, closely adhering to the stem, membranous. Inflorescence a spike which is terminal and with conspicuous bracts spirally arranged on the rachis either closely imbricating or lax; subtending 1-5 flowers (out of which generally only one flower produces seeds); flowers generally showy, large; bracteoles very small and membranous. Calyx tubular, 3-toothed, split on one side to about 1/3 of its length from the top, membranous. Corolla tube long, slender, segments 3 narrowly linear. Lateral staminodes narrow or broad, petaloid; lip broad, clawed or not, bifid, emarginate or entire. Stamen one per flower, filament long, anther neither crested nor spurred. Ovary very small as compared to the flower, generally hairy, 3-celled, many-ovuled. Style long, passing in between the anther lobes. Stigma broad, ciliate. Capsule trigonous or globose, many-seeded. Seeds enclosed in lacerate aril.

Hedychium species are generally found growing in the edges of tropical and subtropical forests (rarely ascending up to 2400 m.) forming patches in marshy areas and on grassy slopes. Some grow as epiphytes on wet rocks or tree trunks (*H. ellipticum*, *H. thyrsiforme*, *H. villosum* etc.) but this epiphytic habit is rather facultative. All species grow in bright sunlight and are never found growing as undergrowth. In epiphytic species roots are generally densely covered by white or creamy hairs. Many of the species, particularly *H. coronarium, H. gardnerianum* and *H. coccineum* are cultivated in the gardens as ornamental plants. Rootstock of *H. spicatum* is used in medicine (Kirtikar and Basu, 1935, p. 2430). Otherwise, they are not of much value as economic plants.

IMPORTANT TAXONOMIC CHARACTERS

As stated earlier, Baker as also other investigators have recognised the various species of *Hedychium* on the relative lengths of stamen and the lip, nature of the lip, degree of pubescence and glabrousness of the under surface of the leaves, number of flowers per bract and compact or loose nature of the spikes. But the observations on both the living and herbarium specimens show that the character of pubescence is very variable, since species described under the group "leaves glabrous beneath" in Fl. Brit. Ind. (l.c. pp. 227-228), show a few or many scattered hairs on the midrib below. Further, species with "leaves completely glabrous beneath" are rarely found in the genus. Old herbarium specimens usually do not give the correct idea about the pubescent nature of the leaves as in many cases these hairs fall off even with gentle brushing. On the other hand, the nature of the lip and compact or looseness of the spike appear to be more reliable characters of taxonomic interest rather than the relative lengths of the lip and the stamen.



Bracts & Lips in Hedychium (× 0.7)

The lips may be classified into two broad categories (Fig. 1) 1. distinctly bifid and 2. entire or emarginate. Amongst distinctly bifid lip types a few further classes may be recognised viz. 1. coronarium type (*H. coranarium, H. greenii* and *H. coccineum*), 2. marginatum type (*H. marginatum, H. spicatum* and *H. stenopetalum*), 3. venustum type (*H. venustum, H. villosum* and *H. thyrsiforme*) and 4. gracile type (*H. densiflorum, H. aureum* and *H. gracile*). Similarly, amongst the entire or emarginate lip types a few smaller groups viz. 1. ellipticum type including lips of irregular shape i.e. entire or emarginate (*H. ellipticum* and *H. gardnerianum*) and 2. gratum type with always emarginate lip (*H. gratum*) may be easily recognised.

These various types of lip enumerated above, though taxonomically important, cannot provide absolute reliability for the separation of one species from another. Accordingly, the lip characters should be valued along with other characters *viz.* redness or otherwise colour of flowers, and nature of the bracts borne on a condensed or lax spike etc.

Accordingly, a re-evaluation of the taxonomic importance of various morphological characters as discussed above has been made in the key presented below:

KEY TO THE SPECIES OF *HEDYCHIUM*

- A. Mature spike strobilus-like; bracts more than 1.5 cm. broad imbricate:
  - Flowers white, yellow or red; lip bifid (slightly so in *H. coronarium* var. *urophyllum*), stamen as long as or slightly longer than the lip.
    - Bracts more than one-flowered:
      - Flowers white or yellow *coronarium*
      - Flowers red *greenii*
    - Bracts 1-flowered, with a horny margin and a tuft of hairs at tip; flowers always yellow *marginatum*
  - Flowers always white; lip emarginate, stamen distinctly longer than the lip *gratum*
- A. Mature spike very dense, short; bracts about 1 cm. broad, lower ones generally empty, upper tightly rolled around the calyx:
  - Lip entire or emarginate, oblanceolate or club-shaped . . *ellipticum*
  - Lip distinctly bifid, urceolate, lobes acute . *thyrsiforme*
- A. Mature spike lax, generally very long; bracts up to 2 cm. broad;
  - Flowers not red:
    - Flowers more than 3 cm. long:
      - Leaves glabrous or pubescent beneath; lip distinctly bifid:
        - Bracts 1-flowered:
          - Calyx longer than the bract; lip urceolate, distinctly clawed . *venustum*
          - Calyx as long as or shorter than the bract; lip oblanceolate, decurrent into a short claw *spicatum*
        - Bracts 2-4-flowered:
          - Flowers usually white rarely yellowish, never orange coloured:
            - Leaves glabrous beneath; calyx densely brown-hairy; lip urceolate, distinctly clawed *villosum*
            - Leaves pubescent beneath; calyx not densely hairy; lip oblanceolate, decurrent into a short claw *stenopetalum*
          - Flowers orange . . . . . *aurantiacum*
      - Leaves white pulverulent beneath; flowers lemon-yellow-coloured; lip entire or emarginate (deeply lobed in *H. gardnerianum* var. *pallidum*) *gardnerianum*
    - Flowers up to 3 cm. long:
      - Spike up to 6 cm. long; flowers golden yellow; lip clawed . . *aureum*
      - Spike more than 8 cm. long; flowers white or yellow; lip not clawed:
        - Flowers white; margins of the lobes of the bifid lip not wavy *gracile*
        - Flowers yellow; lip cuneate at the base, margins of the lobes wavy *densiflorum*
  - Flowers red:
    - Spike 15-25 cm. long; bracts green; margin of the lip erect; lateral staminodes linear . . . . . . *coccineum*
    - Spike up to 12 cm. long; bracts red; margin of lip deflexed; lateral staminodes broad-lanceolate . *angustifolium*

DISCUSSION

There has been much controversy in delimiting the species of *Hedychium*, particularly in *H. coronarium* complex. Baker in Hooker's Flora of British India treated *H. maximum* Rosc., *H. flavum* Roxb., *H. flavescens* Carey, *H. chrysoleucum* Hook. and *H. urophyllum* Lodd. as mere varieties of *H. coronarium* Koen. Schumann (1904) raised all the above varieties, except *H. maximum* Rosc. to specific status. Turrill (1914) following Schumann (l.c.) considered *H. maximum* Rosc. as "probably a variety of *H. coronarium* Koen". Fischer (1928) treated *H. coronarium* Koen. & *H. flavescens* Carey as two good species but *H. chrysoleucum* Hook. as a mere variety of *H. flavescens.* Baker and Fischer described the variety *chrysoleucum* Hook. as having "lip white with large yellow patch in the centre", while Turrill attributes it as characterised by yellow flowers with "lip and lateral staminodes deep or orange yellow towards the base". Hooker's original description could not however be available for reference to establish the key characters of his variety. Observations on living material of almost all the species in question suggests that there are various intergrades in colour of flowers from pure white to tinged with yellow, pale yellow, golden-yellow to tinged with orange-yellow. It is, therefore, proposed to treat *H. maximum* Rosc., *H. flavum* Roxb., *H. flavescens* Carey, *H. chrysoleucum* Hook., *H. urophyllum* Lodd. together with *H. subditum* Turrill treated here as varieties of the polymorphic species *H. coronarium* Koen.

There are a few specimens collected from Bishop Falls (type-locality of *H. elwesii* Baker) and surrounding spots near Shillong in the Regional Herbarium of Botanical Survey of India, Shillong, and identified by earlier workers as *H. elwesii* Baker. Some of these specimens (*viz.* Nongpoh, *Sharma* 21090; Barpani, *Sharma* 19656; and Umsaw, *Sharma* 19652, *Purkayastha* 10877) on re-examination revealed practically no morphological difference(s) from *H. marginatum* Clarke except for the lack of pale horny margins with a tuft of hairs on the tip of bracts—one of the distinguishing characters for *H. marginatum* Clarke. Therefore, these specimens, bearing one-flowered bracts as distinct from 4-5 flowered bracts characteristic of *H. elwesii* Baker, may be identified as forms of *H. marginatum* Clarke.

However, there are a few specimens (*viz.* Barpani, *U. Kanjilal* 7751 ; Nongpoh, *Sharma* 19653) identified as typical *H. elwesii* Baker, combining the "hairy" nature of undersurface of the leaves, characteristic of *H. marginatum* Clarke and *H. coronarium* with 3-flowered bracts approaching *H. elwesii* Baker. Although Baker attributed bright yellow flowers with slender, bright-red filament to *H. elwesii,* it is not possible to decipher from these dried herbarium specimens without any field notes on the sheets, the presence or absence of these characters. If the identification of these specimens as *H. elwesii* is correct, considering the range of morphological intergrades between typical *H. coronarium* and 6 of its varieties referred to above on the one hand and *H. elwesii* on the other, together with the discovery of a large number of cytological types possessing different somatic chromosome numbers (*viz.* $2n=54$ in *H. coronarium,* $2n=34$ in *H. coronarium* var. *flavescens,* $2n=52$ in *H. coronarium* var. *flavum* and $2n=66$ in *H. elwesii*) it is suggested that *H. elwesii* Baker should also be treated as a variety of *H. coronarium* Koen., as proposed in the enumeration.

The species *H. luteum* Herb. Calcut. appears to be founded on a single specimen collected from Nunklow swamp in the K & J Hills of Assam in October 1852 and deposited in the Central National Herbarium, Sibpore. It is also significant that Baker in his treatment of *H. luteum* considers this species as intermediate between *H. coronarium* var. *flavum* and *H. aurantiacum.* This sheet, however, bears Clarke's determination as *H. coronarium.* Baker who segregates species of *Hedychium* into two sections depending upon the relative lengths of the stamen and the lip and assigns *H. luteum* to section *Macrostemium,* distinguishes *H. luteum* from others in having a stamen "half as long again as the lip". But it may at once be stated that the apparent type sheet of *H. luteum* referred to above has the stamen almost as long as the lip. These considerations together with the non-availability of *H. luteum* elsewhere than Nunklow in Assam, may justifiably lead one to treat *H. luteum* Herb. Calcut. as merely another biotype of *H. coronarium,* a most variable species in nature.

H. griffithianum Wall. although included in the section *Macrostemium* of the genus, is described as having the stamen "rather longer" than the lip. In all other morphological characters, however, it resembles *H. venustum* Wight of *Gandasulium* section. As stated earlier, the relative length of the stamen and the lip is a variable character within a species, particularly in *H. venustum* Wight, which shows the stamen as shorter than, as long as or slightly longer than the lip. Wallich's description of *H. griffithianum* is based on Griffith's and Hooker f. and Thomson's collections of the specimens from Khasi hills, whereas *H. venustum* Wight is based on specimen(s) collected from Nilgheri by Wight himself. This apparent geographical separation between the two species is now bridged over by the discovery of typical *H. venustum* from Khasi hills (*U. Kanjilal* 7732 ; *Deka* 13188), from Naga hills (*Bor* 19651) etc. It is, therefore, suggested that *H. griffithianum* Wall. (1853) should be merged with *H. venustum* Wight. (Mar. 1853).

Again, Baker considered *H. longifolium* Rosc., *H. squarrosum* Ham., *H. roscoei* Wall. and *H. angustifolium* Roxb. as varieties of *H. coccineum* Ham. Though there may not be any controversy regarding the varietal status of the others, *H. angustifolium* Roxb. differing from *H. coccineum* Ham. in the following respects, must be considered as a distinct species.

H. coccineum	*H. angustifolium*
1. Leaves very long and narrow.	Leaves short and broad.
2. Spike 15-25 cm. long.	Spike upto 12 cm. long.
3. Flowers (excluding the long stamen) 5 cm. long.	Flowers (excluding the long stamen) 7 cm. long.
4. Bracts green.	Bracts dark red.
5. Lateral staminodes narrow linear.	Lateral staminodes broad lanceolate.
6. Lip 2 by 2 cm., orbicular with erect margins.	Lip 4 by 3 cm. orbicular with deflexed margins.

Lastly, it is interesting to comment upon two specimens borrowed from Central National Herbarium, Sibpore, for our studies.

One *viz.* K. & J. Hills, Cherrapunji, *G. Mann,* without number, collected in August 1880, identified as *H. speciosum* Wall. does not certainly belong to this species, since spike is very short as in *H. coronarium,* bracts are 3-flowered ; calyx half as long as the corolla tube, the latter being 6.5 cm. long, and stamen only slightly exceeding the lip. It, therefore, appears nearer to *H. subditum* Turrill. The specimen, however, is not well mounted to show the nature of the lip and does not bear any field note and therefore it is difficult to identify this sheet definitely as *H. subditum* Turrill.

The other specimen *viz.* Naga Hills, Kohima, *Prain* 20, collected in the year 1886 bears the identification as *H. elatum* R. Br. But the specimen shows the leaves quite narrow (about 5 cm. broad) and densely hairy beneath unlike the broad (7 to 10 cm.) and glabrous leaves characteristic of *H. elatum* Br. The absence of any note on the colour of the flower, hairy nature of the under surface of the leaves, long lax spike and orbicular bifid lip would suggest its identity as *H. coccineum* Ham. var. *longifolium* (Rosc.) Baker.

It may, however, be stated that *H. griffithianum* var. *glanduligerum* (possessing glabrous leaves and the whole body of the plant and especially flowers very glandular), and *H. hookeri,* both from the Khasi hills ; *H. speciosum* from Sylhet ; *H. elatum* from Sikkim and *H. wardii* (Fischer, 1936) from Lohit Frontier Division, N.E.F.A., and *H. carneum* Rosc. with white flowers tinged with pink from East Himalayas, are apparently rare in Eastern India and have not been collected by the Botanical Survey of India, Shillong, up to date. Accordingly, these species could not be available for study and therefore, are not included in the key suggested in this paper.

An enumeration of 17 species together with notes on the habit and habitat of each species and their geographical range and altitudinal distribution in Eastern India and elsewhere is appended.

ENUMERATION

Hedychium angustifolium Roxb. Cor. Pl. 3: 248 t. 251, 1811. *H. coccineum* Buch.-Ham. var. *angustifolium* (Roxb.) Baker in F.B.I. 6: 232, 1892. In marshes. Leaves broad, short. Spike short, bracts dark-red. Flowers red (June-July). Not common, K. & J. Hills, Jowai, *Deka* 10135.

Distribution: Tropical regions of Eastern India, East Pakistan.

H. **aurantiacum** Wall. ex Baker in F.B.I. 6: 232, 1892. Growing on slopes. Flowers orange-coloured (October). Rare. Kameng F. D., Bomdi-la top, *Rolla* 1392.

Distribution: Kumaon to Nepal and East Himalaya (1525 m. or more).

H. **aureum** Clarke et Mann ex Baker in F.B.I. 6: 229, 1892. Epiphytic or terrestrial. Flowers yellow. (June to September). Not rare. K. & J. Hills, Shillong, *Naik* 2141; Naga Hills, without precise locality, *Bor* 21874; Kameng F.D., Sissini, *Rolla* 1247; Tirap F.D., on the way from Kheti to Tinchha, *Panigrahi* 14545.

Distribution: Endemic to Assam & NEFA.

H. **coccineum** Buch.-Ham. ex Smith in Rees, Cyclop. 17: 5, 1811, var. **coccineum.** Up to 2 m. tall. Flowers red (June to August). Common in marshy areas and amongst grasses K. & J. Hills, Shillong, *U. Kanjilal* 2296; Nongpoh, *Sharma* 19647; Nongstoin, *Panigrahi* 16438; N. Cachar, Hafflong, *Craib* 326; Naga Hills, Phesama, *Prain* 23; Kohima, *Bor* 16182. Orissa, Mayurbhanj, Gurguria to Jenabil, *Panigrahi* 12420.

Distribution: Central and Eastern Himalaya, Eastern India, East Pakistan, Ceylon.

Var. **longifolium** (Rosc.) Baker in F.B.I. 6: 231, 1892. In swamps along the border of forests. Leaves very long, hairy beneath. Flowers red (June to August). Common, K. & J. Hills, Shillong. *U. Kanjilal* 6742; Cachar, Silchar, *U. Kanjilal* 10592; Lakhimpur, Jeypore, *Purkayastha* 19646.

Distribution: Eastern tropical Himalaya, Assam, Burma.

Var. **squarrosum** (Hamilt.) Baker in F.B.I. 6: 231, 1892. In open wet grass-lands. Leaves very narrow. Flowers red (June-July). Not rare. K. & J. Hills, Jowai-Badarpur road, *Deka* 10097; Naga Hills, without precise locality, *Bor* 21216.

Distribution: Same as for var. *longifolium*.

H. **coronarium** Koenig in Retz. Obs. 73, 1783, var. **coronarium.** Leafy stem about 1-2 m. Flowers pure white (July to October). Common. K. & J. Hills, Umran, *Sharma* 10913; Nongpoh, *Saikia* 22685; Cherrapunji, *Panigrahi* 4960; Naga Hills, without precise locality, *Bor* 21209; Tirap F.D., on the way from Niusa to Wanu (1440 m.), *Panigrahi* 15018; Bihar, Singhbhum Tholkabad, *Subba Rao* 23225.

Distribution: Throughout India in wet places, Ceylon, Burma, Malaya.

Var. **chrysoleucum** (Hook.) Baker in F.B.I. 6: 226, 1892. Flowers white (July to October) with yellow patch at the base of the lip. Not common. K. & J. Hills, Jowai, *Deka* 5020; Barpani, *Deka* 21727 (flowers yellow); Tirap F.D., Soha village (1166 m.), *Rolla* 20390.

Distribution: Endemic to Eastern India.

Var. **maximum** (Rosc.) Baker in F.B.I. 6: 226, 1892. In the edge of forests in moist localities. Bracts ciliated. Flowers white, large. Rare. K. & J. Hills, 35 miles from Shillong on G. S. Road, *Deka* 22629.

Distribution: Endemic to Eastern India.

Var. **urophyllum** (Lodd.) Baker in F.B.I. 6: 226, 1892. Flowers golden yellow (July). Lip slightly bilobed. Filament yellow. Rare. K. & J. Hills, Barpani, *U. Kanjilal* 7733.

Distribution: Endemic to Assam.

Var. **subditum** (Turrill) Naik, comb. nov. *H. subditum* Turrill in Kew Bull. 370, 1914. *H. flavum* Rosc. Pl. Monandr. Sect. t. 49, 1828, non Roxb. Flowers yellow (August). Calyx half as long as the corolla tube; stamen slightly longer than the lip. K. & J. Hills, Jorain road 45 miles from Shillong, *Deka* 17126.

Distribution: Doubtfully endemic to Eastern India.

Var. **elwesii** (Baker) Naik, comb. nov. *H. elwesii* Baker in F.B.I. 6: 226, 1892. Flowers yellow (July). Filament red. Not common. K. & J. Hills, Barpani, *U. Kanjilal* 7751; Nongpoh, *Sharma* 19653.

Distribution: Endemic to Khasi hills.

H. **densiflorum** Wall. in Hook. Kew Journ. Bot. 5: 368, 1853. Epiphytic or terrestrial. Flowers yellow (August). Rare. Kameng F. D., Kalaktang (2100 m.), *Ramswamy* 11616.

Distribution: Temperate Himalaya from Nepal eastwards.

H. **ellipticum** Hamilt. ex Smith in Rees, Cyclop. 17: 2, 1811. Generally lithophytic on bare rocks. Flowers white (June to August). Common. K. & J. Hills, Barpani, *U. Kanjilal* 5795; Jowai, *Rolla* 2557; Nongkhlaw, *Panigrahi* 16199; Naga Hills, without precise locality, *Bor* 21208.

Distribution: Tropical Himalaya from Garhwal eastwards, Assam.

H. **gardnerianum** Rosc. Pl. Monandr. Scit. t. 62, 1828, var. **gardnerianum.** Leaves white pulverulent beneath. Flowers lemon yellow (July to August). Lip entire or emarginate. Common. K. & J. Hills, Shillong, *U. Kanjilal* 7224; Sohrangkham forest, *P. C. Kanjilal* 8349; Lakhimpur, without precise locality, *Burkill* without no.; Kameng F.D. Sissini, *Panigrahi* 6271;

SUBANSIRI F.D. Khuni Pahad, *Panigrahi* 19597 ; SIANG F.D. Minguing to Takepokong (1160 m.), *Rolla* 17777.

Distribution: Nepal, Eastern Himalaya & Khasi hills.

Var. **pallidum** (Regel) Baker in F.B.I. 6: 230, 1892. Lip bifid. Flowers pale yellow (September). Rare. K. & J. HILLS, Wahnong pine in Shillong, *U. Kanjilal* 7408.

Distribution: Aparently endemic to Eastern India.

H. gracile Roxb. Fl. Ind. 1: 14, 1832, var. **gracile.** Epiphytic or terrestrial. Flowers white (May to August). Common. K. & J. HILLS, Peak forest, *Sharma* 21873 ; Cherrapunji, *Deka* 23085 ; LOHIT F.D. Dreyi to Shoetiang (1200 m.), *Rolla* 10487.

Distribution: Eastern Himalaya, Khasi hills, Naga Hills, East Pakistan.

Var. **glaucum** (Rosc.) Baker in F.B.I. 6: 229, 1892. A stouter plant. Leaves glaucous beneath. Spike longer (August-September). Rare. K. & J. HILLS, Kyllang rock, *U. Kanjilal* 2528.

H. gratum Wall. ex Baker in F.B.I. 6: 332, 1892. In grassy slopes. Flowers snow white (June). Lip emarginate. Rare. K. & J. HILLS, 14th mile from Markasa to Nongstoin, *Panigrahi* 16446.

Distribution: Endemic to Assam.

H. greenii W. W. Smith in Rec. Bot. Surv. Ind. 4: 272, 1911. On the hill slopes amongst grasses. Flowers red (July). Rare. WEST BHUTAN (900-1200 m.) *Green* without no. (Type); DARJEELING, Munsong to Kalimpong, *Green* 7734.

Distribution: Endemic to Eastern India.

H. marginatum Clarke in J. Linn. Soc. 25: 75, t. 31, 1889. In moist localities. Bracts one-flowered with a tuft of hairs at the top. Flowers yellow (September-October). Not common. K. & J. HILLS, without precise locality, *Mann* 362 ; NAGA HILLS, Kohima, *Deka* 19654 ; TIRAP F.D. Niusa to Wanu (1440 m.), *Panigrahi* 15018.

Distribution: Endemic to Assam and NEFA.

H. spicatum Hamilt. ex Smith in Rees, Cyclop. 17: 3. var. **spicatum.** In the edges of forest. Flowers white (July). Anther yellow. K. & J. HILLS, Jowai-Badarpur road, *Deka* 10134.

Distribution: Subtropical Himalaya from Kumaon eastwards, Assam.

Var. **acuminatum** Wall. in Hook. Kew Journ. Bot. 5: 328, 1853. Leaves broad acuminate. K. & J. HILLS, Upper Shillong, *Sharma* 10384 (the only vegetative specimen).

Distribution: Doubtfully same as for type variety.

H. stenopetalum Lodd. Bot. Cab. t. 1902. Stout herb in moist soil, rarely in shady places in tropical forests. Flowers white (August). Common. K. & J. HILLS, Um Pih in Shillong. *U. Kanjilal* 7245 ; Jowai, *Deka* 17114 ; LAKHIMPUR, Jeypore, *Purkayastha* 19645 ; KAMENG F.D. Kalaktang, *Panigrahi* 15530; LOHIT F.D. Heyuliang to Nara (550 m.), *Rolla* 10845.

Distribution: Eastern Himalaya, Assam, Burma.

H. thyrsiforme Hamilt. ex Smith in Rees, Cyclop. 13: 4. 1811. Epiphytic or terrestrial. Flowers white (June to September). Not common K. & J. HILLS, Lao-Soh Mynkhar, *U. Kanjilal* 5939 ; SUBANSIRI F.D. 8th mile from Kimin to Ziro, *Panigrahi* 19348.

Distribution: Tropical Himalaya from Kumaon eastwards, Assam, East Pakistan.

H. venustum Wight, Icon. t. 2012, 1853. *H. griffithianum* Wall. in Kew Journ. Bot. 5: 369, 1853. in moist localities. Flowers white (July). Common. K. & J. HILLS, Barpani, *U. Kanjilal* 7732 : Dumpep, *Deka* 13188 ; Pynursla, *De* 21092 ; NAGA HILLS, Kohima, *Bor* 19651 ; TIRAP F.D. Banfera to Longhai, *Panigrahi* 16729.

Distribution: Eastern Himalaya, Khasi hills, Naga hills, Nilgiri hills, W. Ghats.

H. villosum Wall. in Roxb. Fl. Ind. 1: 12, 1832, var. **villosum.** Epiphytic on banks of water courses. Flowers white (February to June). Common. K. & J. HILLS, Barpani, *U. Kanjilal* 6988 ; Cherrapunji, *Saikia* 22693 ; NAGA HILLS, without precise locality, *Bor* 21217; LAKHIMPUR, Kakopathar, *Srinivasan* 21955 ; TIRAP F.D. Chenglang to Khela, *Murthy* 12939.

Distribution: Tropical and subtropical Himalaya from Nepal eastwards, Assam, East Pakistan, Manipur.

Var. **tenuiflorum** Wall. ex Baker in F.B.I. 6: 229, 1892. Epiphytic or terrestrial. Flowers yellow or white (October to November). Rare. K. & J. HILLS, Longkyrden *U. Kanjilal* 6208 ; Pynursla, *De* 19616.

Distribution: Assam, East Pakistan.

A perusal of the geographical distribution of the 17 species suggests that the subtropical and tropical evergreen forests of Eastern India may be considered as "wild home" for the genus *Hedychium,* although only two species *viz. H. densiflorum* and *H. aurantiacum,* both collected from Bomdi-la in Kameng Frontier Division of N.E.F.A. (*Ramswamy* 11616 and *Rolla* 1392) and reported from parts of Nepal and Sikkim, ascend to temperate altitudes.

Although more than 40 species of *Hedychium* are recognised as distributed from Eastern tropics to Madagascar (Hutchinson 1959), it is interesting to note that *H. aureum, H. gratum, H. greenii, H. hookeri* and *H. marginatum* are much restricted in distribution and occur as endemics to Eastern India together with few of the varieties of *H. coronarium.*

Further studies in the genus are being made in pursuance of a programme of work for the compilation of the monocot volume of the Flora of Assam.

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LITERATURE CITED

DARLINGTON, C. D. AND A. P. WYLIE—*Chromosome atlas of flowering plants*. ed. 2, 346 London, 1955.

FISCHER, C. E. C.—*Flora of Madras*. Part VIII 1037-1038. London, 1928.

——, "Hedychium wardii" in *Kew Bulletin* 283, 1936.

HOOKER, J. D.—*Flora of British India*. 6: 225-233. London, 1892.

*HORANINOW, P.—*Prodromus Monographiae Scitaminearum*, etc. 1-45, t. 1-4, 1862.

HUTCHINSON, J.—*Families of flowering plants. Vol. 2. Monocotyledons*. London, 1959.

KIRTIKAR, K. R. AND B. D. BASU—*Indian medicinal plants*. ed. 2. 4: 2430, Allahabad, 1935.

*KOENIG—in Retzius, Observ. Bot. 3: 73, 1783.

SCHUMANN, K.—in Engler's pflanzenreich Heft 46, 1904.

SMITH, W. W.—"Hedychium greenii" in *Rec. Bot. Surv. Ind.* 4: 272, 1911.

TURRILL, W. B.—"Hedychium coronarium and allied species" in *Kew Bull*. 368-372, 1914.

* Not seen in original.